



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,226	07/01/2003	Alan F. Jankowski	IL-11019	7754

7590 10/18/2007
Ann M. Lee
Assistant Laboratory Counsel
Lawrence Livermore National Laboratory
P.O. Box 808, L-703
Livermore, CA 94551

EXAMINER

LEE, CYNTHIA K

ART UNIT	PAPER NUMBER
----------	--------------

1795

MAIL DATE	DELIVERY MODE
-----------	---------------

10/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/612,226

Applicant(s)

JANKOWSKI ET AL.

Examiner

Cynthia Lee

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) 14-27 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 28, 29 and 31-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/6/2006 has been entered.

Response to Amendment

This Office Action is responsive to the amendment filed on 12/6/2006. Claims 1-27 are pending. Claims 14-27 and 30 are withdrawn from further consideration as being drawn to a non-elected invention.

The Objection to the Specification has been withdrawn.

Applicant's arguments have been considered. Claims 1-13, 28, 29, 31-42 are rejected for reasons stated herein below.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 28 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims Analysis

The functional recitations in claims 9, 10, and 34 have been considered but was not given patentable weight because it has been held by the courts that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (BdPatApp & Inter 1987). See MPEP 2115. It has been held by the courts that claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber* 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). See MPEP 2115.

The limitation "for combining fuel and oxidant and generating heat" in claim 37 has been interpreted as intended use language. It has been considered, but was not given patentable weight. It has been held that if a prior art structure is capable of performing the intended use, then it meets the claim. See, e.g., *In re Schreiber* 128, F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). See MPEP 2111.02.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 9, 10, 12, 13, 28, 29, 31, 32, 34, 37, 39-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Pettit (US 6077620).

Maru discloses an apparatus comprising a fuel cell stack having a pair of electrodes including an anode and a cathode, and a thin film electrolyte disposed therebetween; a fuel processor 7 having a manifold positioned in fluid communication with the fuel cell stack, the manifold adapted to convey a fuel to the anode and a catalyst adapted to reform the fuel. The reform catalyst is located in the manifold and contacts the anode. See fig. 1 and 2:50-3:1-10.

Maru does not disclose the electrolyte comprising a solid oxide. However, Ito teaches of the advantages of solid oxide fuel cells (SOFCs) due to its high operating temperature, such as small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid (1:20-29). The electrolyte body can be a thin film (3:10-15). Thus, one of ordinary skill in the art at the time the invention was made using Maru's fuel cell stack would be motivated to use the fuel cell stack with solid oxide fuel cell plates for the benefit of achieving small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid, as taught by Ito.

Maru modified by Ito does not expressly disclose a manifold comprising a flow passage having at least one dimension less than 5 millimeters. However, the size of the flow passage controls the amount of reactants flowing through the fuel cell, and thus affects the amount of gas being reformed and the amount of energy generated by the

Art Unit: 1795

fuel cell. The size of the flow passage is a result effective variable and it has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05.

Maru modified by Ito does not teach a combustor thermally coupled to the fuel processor. Pettit teaches a combustor 28 providing heat to the reformer by the fuel from a liquid fuel supply providing fuel for the fuel cell. The combustor includes a catalyst 52 (applicant's claim 35). See fig. 1. It would have been obvious to one of ordinary skill in the art at the time the invention was made to thermally couple a combustor to the fuel cell of Maru and Ito for the benefit of vaporizing the fuel supply before entering the reformer.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Pettit (US 6077620) as applied to claim 1 above, and further in view of Carter (US 2003/0232230).

Maru modified by Ito and Pettit teaches all the elements of claim 1. Maru modified by Ito and Pettit does not teach that the electrolyte thickness is less than 10 micrometers. However, Carter teaches that thick electrolyte layer leads to relatively high electrical resistance and electrolyte thickness is about 5-20 micrometers in prior art [0010]. Thus, it would be have been obvious to one of ordinary skill in the art at the time

Art Unit: 1795

the invention was made to make the electrolyte thickness less than 10 micrometers for the benefit of decreasing the electrical resistance, as taught by Carter.

Claim 11, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Pettit (US 6077620) as applied to claim 1 above, and further in view of Mallari (US 2003/0044674).

Maru modified by Ito and Pettit teaches all the elements of claim 1. Maru modified by Ito and Pettit does not teach that the manifold includes at least one wall comprising silicon. However, Mallari teaches that some of the advantages of silicon platform provides include: (1) the ability to uniformly carry a catalyst on a surface or within a bulk fluid flow-through matrix, (2), the ability when appropriately doped, to function as a current collector for the transmission of an electrical current, and (3) the ability to be selectively sculpted, metallized and processed into complicated structures via semiconductor micro-fabrication techniques [0028]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the manifold comprising silicon for the benefit of easy manufacturing the fuel cell apparatus on a microscale.

Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Pettit (US 6077620) as applied to claim 1 above, and further in view of Steinfort (WO 02/41425).

Maru modified by Ito and Pettit teaches all the elements of claim 1 and are incorporated herein. Maru modified by Ito and Pettit teaches a heater. Pettit teaches that the vaporizer in the combustor is a heat exchanger that extracts heat from the combustor exhaust to vaporize liquid MeOH (3:50-55 of Pettit), but does not teach that the heater is an electric heater. Steinfort teaches a heater that is an electric heater (see Abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the preheater of Holladay as an electric heater, as taught by Steinfort, because it is one form of heater that is commonly used in the fuel cell art. Further, Steinfort's electric heater is an art recognized equivalent of a heater. See MPEP 2144.06.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Pettit (US 6077620) as applied to claim 1 above, and further in view of Sederquist (US 2003/0003332).

Maru modified by Ito and Pettit teaches all the elements of claim 1 and are incorporated herein. Maru modified by Ito and Pettit teaches a catalyst (8 in Fig. 1 in Maru), but does not teach the catalyst as PtRu. Maru teaches a fuel reforming catalyst as Ni, NiCr, NiCo, and Ni-Mo. Sederquist teaches a fuel processor comprising a selective oxidizer catalyst composition and noble metal reforming catalyst compositions, such as Pt/Ru as catalyst [0045]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute Maru's catalyst for Sederquist's Pt/Ru as catalyst in the fuel processor of Maru modified by Ito and Pettit because it has

Art Unit: 1795

been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Claims 1 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holladay (US 7077643) in view of Ito (US 5227258)

Holladay discloses a microreformer 106 and a microcombustor 104 connected to a fuel cell (not shown) (10:36). The microreformer has a manifold 128. See fig. 1. The Examiner notes that a fuel cell necessarily has a pair of electrodes including an anode and a cathode, and an electrolyte disposed therebetween. The fuel processor comprises a catalyst 136. See fig. 1. The combustor is disposed on the microreformer (applicant's claim 33).

Holladay does not disclose the electrolyte comprising a solid oxide. However, Ito teaches of the advantages of solid oxide fuel cells (SOFCs) due to its high operating temperature, such as small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid (1:20-29). The electrolyte body can be a thin film (3:10-15). Thus, one of ordinary skill in the art at the time the invention was made using Holladay's fuel cell stack would be motivated to use the fuel cell stack with solid oxide fuel cell plates for the benefit of achieving small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid, as taught by Ito.

Art Unit: 1795

Holladay discloses a fuel cell and a manifold with a fuel processor, but does not disclose that a manifold is disclosed on the fuel cell stack. It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the configuration of the fuel cell system by disposing the microreformer on the fuel cell stack for the benefit of providing a compact connection between the fuel gas supply and the fuel cell.

Response to Arguments

Applicant's arguments filed 12/6/2006 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1795

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ckl

Cynthia Lee

Patent Examiner


SUSY TSANG-FOSTER
PRIMARY EXAMINER